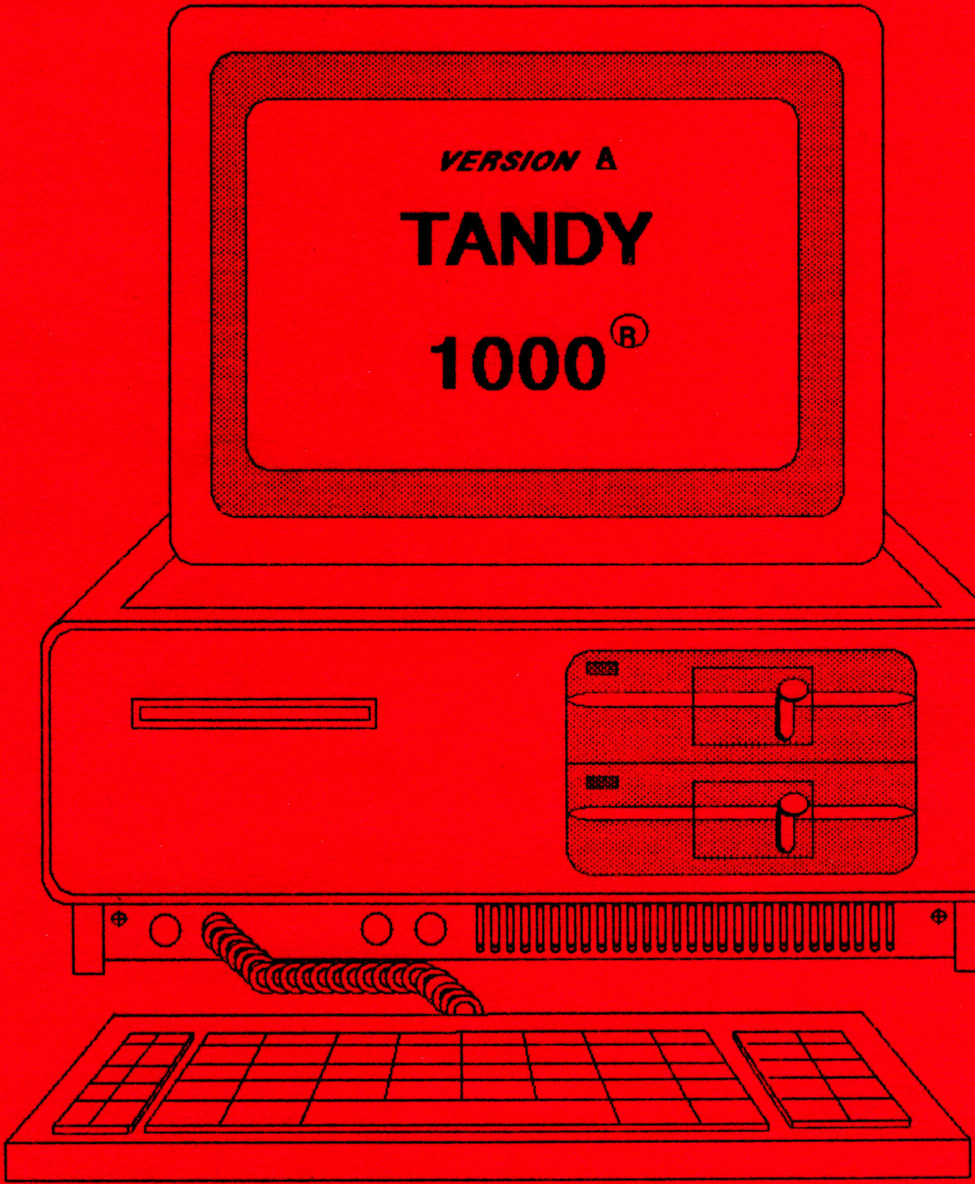
PC–SPRINT 1000A®

USERS GUIDE

for the



PC–SPRINT® Computer Products, Electronic Design and Consulting

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PC-Sprint 1000A

Users Guide v1.1

A LITTLE BACKGROUND ...

The original PC-Sprint was the first freeware/hardware speed enhancement board for the IBM PC/XT and close compatibles. The TANDY 1000, while very software compatible with the PC, is not a true hardware "clone". Due to demand from Tandy owners, the PC-Sprint 1000 was designed specifically for both the original TANDY 1000 and the Tandy 1000A to give those machines the same speedup option as the PC.

The Norton SI index has become the standard of PC speed measurement. A normal TANDY 1000A running at a clock speed of 4.77 megahertz (mhz) registers an SI of 1.0 (same as the PC). A 1000A using a PC-Sprint 1000A and a NEC V20 8 mhz processor registers 2.6 to 2.9, depending on PC-Sprint options you choose.

PC-Sprint 1000 works by exploiting the underutilized speed capability of the 1000's design. The clock speed of the 1000 was probably chosen simply because that is the speed IBM PC's run at. most 1000's however, are capable of substantially higher clock rates. PC-Sprint 1000 runs your machine at the highest practical clock rate, while allowing you to switch between high speed and normal speed "on-the-fly". In either mode, PC-Sprint keeps all other timing sources constant, ensuring no loss of compatibility.

BEFORE YOU START ...

Please read this manual completely and try to get a general understanding of what's involved before you begin. Installation of the PC-Sprint isn't difficult, but a little time now can avoid problems later. That's particularly important since the 1000A has not remained exactly the same since its introduction. Tandy has made several revisions in its design over time, making this manual more of a general guide than a cookbook, so you'll have to use your judgement at several points in the installation. If you have a hard disk, you should make a **"backup"** of its contents **BEFORE** you start the installation.

THE USUAL STATIC LECTURE ...

If you've ever installed anything in your computer before, you're probably aware of the precautions concerning static electricity and electronic components. Static discharges are the natural enemy of all electronic equipment - one "spark" can destroy several chips. PC-Sprint is less susceptible to static than most other things, like processor and clock chips, but still should be handled carefully.

For protection during shipping, the PC-Sprint 1000A kit is shipped in an anti-static container. **Do not** remove parts from their respective containers until you are actually ready to install them. While you are installing the kit, try to occasionally touch some large piece of metal, like the internal frame of the computer. Also, avoid carpeted areas and try not to do the work on a very dry day. During installation, you will have to directly handle some chips. When you do, hold them by the ends to minimize touching the pins. If this discussion has you worried - don't be - the chance of static damage is very small if you simply follow the precautions.

THE GAME PLAN ...

As previously mentioned, the Tandy 1000A has undergone several revisions since its introduction. That makes the installation a little more complicated than it would otherwise have to be. The major steps in the installation are as follows:

1) Determine if you have the correct version of the PC-Sprint 1000 for your computer.
2) Upgrade the computer's processor to a high speed V20.
3) Remove the clock chip, place it on the PC-Sprint 1000A board and then plug the PC-Sprint in place of the clock chip.
4) Choose the method desired to correct the Direct Memory Access (DMA) controller clock.
5) Select/install other options depending on choice made in 4) above.

As we progress with the installation, several drawings will be referenced. These drawings are generally a composite of the different versions of the 1000A in existence. As such, they may not perfectly match your particular machine, but will still be useful in understanding the accompanying text.

CHIPS AND DIP ...

Before we continue, let's sidetrack a little and discuss how to handle chips. During the installation, you will be asked to find and replace some chips. Chips come in several different forms, but all of the ones we will be dealing with are what's called a Dual Inline Package (dip), which refers to the fact that the chip legs are in a double row on the sides of the body. Some examples are shown in figure 3.

Unfortunately, this type of chip can be plugged in backwards - which will usually **DESTROY** it when power is turned on. Figure 3 shows a top view of several different types of dips (others do exist, but you get the idea). The key in finding which way a chip gets plugged in is the notch and/or dot on the body at one end. Different manufacturers always use one or both of these schemes, i.e. look for the notch on one end or a dot by pin 1 to orient the chip. You can also see how to find a given pin on the chip - locate pin 1, count along that side to the end, switch sides on that end and continue counting 'til you reach the pin opposite pin 1.

Now that you know which way is up on a chip, let's talk a little about removing and inserting them. Smaller chips, less than 40 pins, can be removed by using a small screw driver or bent paper clip to pry up gently on alternate ends until it eases out. Make sure that you pry between the chip and the socket, **NOT** between the socket and the motherboard. Larger chips, like processors, are more difficult to remove without bending the leads. A plastic strip is supplied with the PC-Sprint kit to aid in removing them. As shown in figure 4, slide the strip underneath the chip, between the chip and socket (**NOT** between the board and the socket), bend the strip upward, and pop the chip out by alternately pulling on the ends while holding the other end stationary. **Keep your face clear** - the chip may fly out with great force. Ease each end up only a little at a time to avoid bending the pins.

Once the chip is out, turn it over and make sure the pins are still in a row and that they are evenly spaced. If not, gently push them into place with a small object. Then push all the chip legs on a side against a flat surface to align the row. To make it fit in the socket, you may also have to bend the rows in slightly.

Inserting chips into a socket is not too difficult, but must be done carefully. First, place the chip over the socket, making **ABSOLUTELY SURE** that it is aligned in the **correct** direction. Then, partially insert one row of legs into the socket and with a slight "rolling" motion, get all pins of the opposite row into its side of the socket. You may have to remove the chip again and "bend in" the rows, as previously mentioned, to get both rows in place (re-check alignment). Make sure each pin is in its individual connector on the socket and push down on the chip body with a finger. Use increasing pressure until you feel the pins "grab" securely - don't use excessive force. Re-check each pin to make sure it is in place - if not, remove it, straighten the pins and reinsert. Check the corner pins in particular, sometimes they will "fold" under the body of the chip and will look ok but not really be in the connector.

FINALLY, TIME TO OPEN THE HOOD ...

First and most important, unplug the computer's power cord from the outlet to avoid any possibility of shock. While you are back there, it is a good idea to disconnect any external cables (crt, printer, etc.) to protect them from you and you from their power systems. Do not depend on simply turning off the computer. This is important to make sure you don't inadvertantly remove or install any boards or chips with power on - **THIS COULD DAMAGE THEM.**

Now refer to Figure 1. Remove the keyboard and joystick cables and the two screws securing the front cover of the machine. Slide the cabinet forward and off to expose the motherboard.

IS YOUR MACHINE A TYPE A ? ...

Recent 1000's have undergone a major revision in their internal design - namely, the "A" motherboard. These new motherboards are so different in internal design that a special version of the PC-Sprint 1000 was developed to accomodate them. You should already have determined which type of motherboard you have by following the instructions given on a sheet separate from this manual. If you haven't, do so now. if, for some reason, you didn't get those instructions, determine what type of motherboard you have now. To make the decision, skip ahead to Figure 6 and compare it to your motherboard. PC-Sprint works by replacing the clock chip. The "A" motherboard has a special custom type with 40 pins. The clock chip in the 1000A has the word TANDY marked somewhere on it, has 40 pins (20 per side) and is towards the metal disk drive cover. The printing on the mother board close to the clock chip will designate it as U25. The "A" motherboard also has a large, square chip (with pins on all four sides), towards the back of the machine, roughly in line with the expansion connectors. Another way to tell is that the "A" has a socket for the 8087 next to the processor chip. If your computer doesn't generally match this description, you most likely have the "ORIGINAL" motherboard. In this case, the type of PC-Sprint 1000 shipped with THIS manual is not for your machine. DAS Tech will exchange it for the correct one at no cost. Simply return the entire kit (postage prepaid), along with your sales invoice (so we know where to send the new board) and a note explaining that you have the wrong type and wish to exchange it. Call DAS Tech if you have questions.

THE BRAIN TRANSPLANT ...

To get at the processor, remove your expansion boards from the machine. If you've never done that before, look at figure 2. As it shows, remove the screw holding the bracket to the frame (don't lose the screw). Pull the board up and out with a rocking motion. Repeat for each board, noting the position it came out of. One helpful hint - if you have an expansion board with a Time-of-Day/Calendar function, it will have a small battery somewhere on it. Do not lay this type of board flat on a metal or other conductive surface - you may inadvertantly short out the battery and discharge it.

Before we remove the processor, refer to Figure 6 again - it will show you the approximate position of the processor chip (marked U28 on the motherboard). Note the orientation of the processor and remove it using the previous directions and figure 4. Now find the NEC V20 processor chip supplied with the kit - it will be marked V20 somewhere on the body (not 8088). Put it in place of the original 8088. **Make sure** it is aligned the same as the original. Replace all the expansion boards (reverse figure 2), slide the cabinet back on and reattach all cables. The computer should now be back to normal, except for the new processor.

Some **VERY OLD** hard disk systems (pre-1987), sold by Tandy which use a separate Western Digital controller board, **MIGHT** have a defective hard disk BIOS ROM which cause them not to operate properly with the V20. Hardcards, newer disk systems and controllers from other manufacturers **DO NOT** have the "bug". Even if you do have one of the "buggy" BIOS ROMs, the solution is very simple - contact DAS Tech and we will send you a high speed 8088-2 to replace the V20. Please try the V20 first - nothing damaging will happen, even if you do happen to have the defective BIOS. Plug the machine back into the outlet and "boot up" as usual. If the machine seems to operate normally, you have successfully installed the V20. If it does not work correctly, there are two possibilities. The most likely is that the V20 was installed incorrectly. In that case, the machine won't do anything normal at all. Remove the V20 and repeat the process to this point, checking for bent pins, alignment, etc. If your machine seems to start up normally, but just "stops" when it tries to "boot" from hard disk - you probably have the defective BIOS (contact DAS Tech to get an 8088-2). Put your old 8088 in the container the V20 came in for safe keeping.

YOUR OPTIONS ...

PC-Sprint 1000A comes with several options to allow you to configure it best for your computer and preferance. Skip ahead and examine figure 5. In the upper right corner of the PC-Sprint board are the option jumpers, numbered 1 to 6.

These jumper positions are grouped in two's to select variations of the three major options. To select an option, place the plastic "shorting block" over the two pins vertically at the desired position - leaving the other two pins empty (never put the shorting block horizontally so that it crosses over to a different numbered position). The three options are as follows.

WAIT SELECT - For many reasons (poor design, slow ram chips, etc.), some memory expansion boards may not operate faster than the computers normal speed. This option allows you to force the processor to "wait" an extra clock cycle only when it uses memory, effectively slowing down slightly to allow slow boards time to work. Choose this option if you cannot get reliable operation at high speed. To select the "wait state", move the block to position 1, leaving position 2 open. To always run at full speed, put the block on position 2, leaving 1 open. Wait states are automatically disabled in normal speed.

SENSE SELECT - In addition to changing speeds manually via the switch, PC-Sprint allows you to change speed by "sensing" electronic signals inside the computer. The sense jumper allows you to choose the source of the signal used to change speed. When a shorting block is on position 4 (position 3 open), the RED microclip is selected as the source (see section SOFTWARE SPEED SWITCHING in this manual). This will allow you to change speeds by running a simple program instead of using the switch. If you move the block to position 3 (position 4 open), the source is changed to the DMA chip so that the processor clock is automatically changed to normal speed during the time the DMA chip is operating. This is necessary to correct a problem with the DMA chip at high speed (see MEMORY/DMA BOARD section). PC-Sprint has another way to correct the DMA problem which is better, but harder to install - so only use this option if you cannot get the clock substitution method working. If you do select this option, you CANNOT use software speed switching or the highest speed 9.54 mhz clock.

CLOCK SELECT - PC-Sprint allows you to switch between the normal 4.77 mhz clock and a higher speed clock. This option allows you to select between one of two high speed clock sources. If you leave the shorting block on position 6 (position 5 open), a 7.16 mhz clock is selected. Moving the block to position 5 (position 6 open) selects operation at 9.54 mhz. The reason for these choices is that some memory expansion boards are sensitive to the "phase" of the new clock, as well as the speed. The 7.16 mhz. clock has an "odd" phase, while the 9.54 has an "even" phase. Most memory boards work best with the 7.16 mhz. clock so try that first. If operation is erratic, switch to the 9.54 mhz. position by moving the block on position 6 to position 5. You **MUST** also now add a wait state by moving the block from position 2 to position 1 - your machine will not run at all if you don't. Computer operation at 9.54 mhz., with one wait, is only slightly faster than at 7.16 mhz with no wait, so don't be disappointed if you wind up at 7.16 - reliable operation is more important than a small speed improvement. **IMPORTANT - do NOT** select 9.54 mhz operation if you selected DMA sensing (see SENSE SELECT above) - you may lose disk data due to erratic DMA operation, since then even DMA sensing does not correct the DMA chip problem.

NOW THE SPEEDUP BOARD ...

You're at the point where your computer has been upgraded to the new processor and it's time to install the speedup board. Disassemble the computer again, using the previous procedures (don't forget to unplug the power cord).

Take out the PC-Sprint 1000A module from its packing and remove the twist tie from the cables. Compare the board with figure 5 to familiarize yourself with it. Now is also a good time to decide on what options you want to use. We suggest that you leave the option blocks in the standard configuration, namely no wait (position 2), software sense (position 4) and 7.16 mhz clock (position 6) - you can always change later. The general idea here is to find the clock chip on the motherboard and remove it, put the clock chip on the PC-Sprint board, and finally, plug the PC-Sprint back in place of the clock chip.

Again referring to figure 6, find the clock chip (40 pin chip at U25), note its direction, and remove it from the motherboard in the same way you removed the processor chip. Insert the clock chip into the empty socket on the PC-Sprint board, with the notch in the same direction as the other chips on the board next to it (figure 5). Make sure it is oriented properly and has all pins in place. **This is a critical step - double check your work !!!**

The PC-Sprint 1000A board plugs into the empty clock chip socket on the motherboard - you've probably already noticed the double row of pins on the bottom. These pins are much stronger than a chip leg, but can still be bent, so handle the board by its edges. If you accidentally bend a pin during the installation, just gently push it back in place so that it lines up with the other pins again. The two rows of pins are spaced exactly right, so you shouldn't have to bend the pins at all to fit.

The PC-Sprint board plugs into the clock chip socket in a way much like a chip. The best method is to remove all expansion boards from the machine (if you already haven't done so), and insert the board from the open side of the computer. Stand by the open side of the machine and align the PC-Sprint board with the long way of the clock chip parallel to the internal metal cover, as shown in figure 6. Tilt the board slightly, so the more open end is towards you so that you can see the pins on the bottom. Now rest the pins on the far end of the PC-Sprint into the far end of the socket so that all 20 pins line up with their respective connector on the socket. Slowly lower the board until the pins on the other side slide into the near side of the socket - you should sight along the top of the motherboard to visually verify that everyting seems to line up properly. Now place one finger of each hand on an end of the clock chip and press down with increasing force until you feel the pins "grab" in the socket - don't use excessive force. Make sure that the board is firmly in place and is level with the motherboard. The clock chip on the PC-Sprint board should be in the same direction as the chips on the motherboard in the immediate area. Everything should now look very much like figure 6.

THE MEMORY/DMA BOARD ...

Any 1000, to be useful, should have a memory expansion board with DMA. The DMA chip normally uses the same clock as the processor, via a connector tab from the motherboard. Unfortunately, some DMA chips (8237-5 or 9517) may not work correctly at the processor's new clock speed. The PC-Sprint 1000A has two methods to fix this problem. You must now choose which one you want to use - speed sensing or clock substitution.

Speed sensing works by automatically slowing down to normal speed during DMA activity. The advantage to this technique is that installation is greatly simplified. However, this method has some severe disadvantages - if you select this option, you **CANNOT** use software speed switching or the 9.54 mhz clock option. Additionally, the overall speed increase given by the PC-Sprint 1000A drops by 8-12%. We do NOT recommend this option unless you cannot for some reason use clock substitution. To select this option, move the shorting block on pin 4 of the option jumpers to pin 3 (hold the PC-Sprint in place with one hand while you move the block).

Clock substitution works by disconnecting the motherboard clock from the memory/dma board and substituting a normal speed clock only for it. The advantage to this is the best performace is achieved and ALL other options are available to you. We highly recommend you at least try to use this option.

The original clock will be disconnected by using an old engineer's trick - place a strip of tape over the connector tab. This electrically "breaks" the connection without having to cut any wires on the board. The original DMA clock is regenerated by the PC-Sprint board. It is available on the **BLACK** microclip (little "plunger" device - see figure 5). The clip can then be hooked onto the same chip leg that the tab eventually connects to, thus bypassing the motherboard clock.

The following directions apply mainly to the Tandy supplied memory board (part number 25-1004). If you have a different one from a third party, you will have to re-interpret these directions for that particular board. To help, see the DMA TIMING CLIP CONNECTION HINTS section at the end of this manual. It is a list of where to hook the clip for several different expansion boards, as found by PC-Sprint 1000 users. Since there are more and more memory expansion boards available from non-Tandy sources, we would appreciate hearing from you on exactly what chip and pin you found during your installation, if different from these directions. Please contact DAS Tecnologies at the address in the front of this manual with the information. The board manufacturer, chip type, position and pin number will then be included in updated versions of this guide.

To do all this, first make sure that a shorting block is on pin 4 of the option jumpers (pin 3 **MUST** be open). Now locate the memory board with DMA. Get the short length of paper backed tape supplied with the kit. Cut the tape in half lengthwise to make it roughly 1/16 inch wide. Then cut off a few 3/8 inch lengths. There is nothing special about this tape other than being precut to a 1/8 inch width and easily removable. If you have problems with the tape, cut 1/16 by 3/8's inch pieces of ordinary "scotch" tape in place of it. Hold the memory board as shown in figure 7 - component side away from you, bracket to the left, connector tabs down. From the rightmost connector tab B31, count backwards to find B20. It should be 12 back. Carefully place a tape strip completely over the gold tab (on that side only - **NOT both sides of the board**) and trim off excess tape. Make sure that **NO OTHER** tab is even partially covered. You'll probably have to try several times to get it right; use a new piece of tape each time. This step is the same no matter what type of memory board you have - even non-Tandy.
Examine figure 8 - it shows how to connect a microclip to a chip leg. If you have the Tandy 25-1004 memory board, locate pin 15 on the chip labeled 74LS244 at position U1 as printed on the board (use the chip and pin position from the DMA hints if you don't have the 25-1004 board). Hook the **BLACK** clip to it as shown in figure 8. Hold the clip in one hand like a syringe and extend the hook by pressing with your thumb. Hold the board in the other hand and be careful not to stretch the cable. Immediately insert the board into the expansion connector closest to the PC-Sprint board, if possible. It's ok to adjust the angle of the clip to clear obstructions; just make sure that it is solidly connected to the correct chip leg. Replace any other expansion boards into the other expansion connectors, start the screws into the mounting brackets, and tighten **(don't overdo it)**.

If you have a type of memory board different from those listed, the same procedure applies for installing the clip, but you will have to locate the proper chip leg yourself. Also, the board manufacturer may have changed the design, making the hints section incorrect for your board. This can be done by placing the board on a well lighted surface, with the components down. If there is any plastic or metal shield covering the back of the board, remove it, but carefully note how it came apart to ease reassembly.

Find the connector tab that you covered with tape. A wire-like foil trace will connect to it. Follow that trace as it leads away from the tab - it will eventually connect to a chip leg. As it winds its way to the chip, it may suddenly stop at an empty hole. These holes are called "thru-holes" or "vias"; they are actually connections from one side of the board to the other. If you come across one, stick a pin or a thin piece of wire through the hole and flip the board over. The pin will show you where the trace starts out from the hole on the other side. Continue to follow the trace, changing sides as it does. When it finally reaches a chip leg, it may be on the solder side of the board opposite the components. That's no problem, but keep track of the chip leg when you turn the board over. Just to make sure, repeat the whole process - if you find the same chip leg, you're probably right. Write down the chip type, position on the board and pin number. Reassemble the board if necessary. Now install the clip and board as previously described, only use your note to locate the chip pin.

One comment to reassure you - if you happen to find the wrong pin, nothing damaging will result - only the computer will not work and will most likely put out an awful noise from the speaker. Guess how we happen to know that (we all make mistakes).

WHERE TO MOUNT THE SPEED SWITCH ...

Mounting the speed switch on the 1000 is a challenge. The "double wall" construction severely limits convenient places to put it. The best choices are as follows:

1) If you have an unused expansion slot, mark the approximate center of the exposed portion of the blank bracket (from the back) while it is still mounted in the machine. Then, remove the blank bracket, drill a 1/4 inch hole at the place you marked it, and replace it. Take one of the nuts off the switch barrel, insert the barrel through the hole from the inside of the computer and thread the nut back on "finger tight". The dot on the side of the switch body indicates the high speed position; flip the switch towards it and turn the switch until the switch handle points up. Tighten the nut with a small wrench.

2) Drill a 1/4 inch hole in an accessible spot in the plastic just above the expansion slot brackets. Mount the switch as described above.

3) Drill a hole in the front of the cabinet to mount the switch - this is **NOT** recommended since you must remove the switch every time you want to remove the case.

4) Don't mount the switch at all. Just tape the cable to the metal housing protecting the disk drives and use software speed switching or leave the switch in high speed position permanently without software speed switching.

You must choose the method to use or think of another possibility. I would suggest number 4, at least for the first few weeks of operation. You will have a better idea by then what would be best.

THE ROAD TEST ...

You're now done with most of the installation. Replace the cover, reattach all cables, plug in the power cord and set the speed switch to normal. For testing, use backup programs on floppy disk only - just in case. Now power up the machine - if everything worked ok, the computer will boot up normally. Run a few programs to see if they work correctly. Now switch to high speed and reset using the front panel switch. Again, the machine should start up normally. Re-execute the same programs; they should run noticeably faster. Since PC-Sprint 1000A speeds up only the processor, programs that do a lot of I/O work (disk, screen, etc.) won't show too much improvement. Processor intensive operations, like spreadsheet recalcs, in-memory database searches, etc., will be much more responsive.

SOFTWARE SPEED SWITCHING ...

If you now decide to use software speed switching, carry out the directions in this section. Make sure that a shorting block is on position 4 of the option jumpers (position 3 open) and you must have used clock substitution on your memory/dma board with the black microclip. Be sure that your computer works properly at high speed before performing this section. Software switching is **completely optional**, you do not have to use it at all. If you decide not to use it, simply roll the red microclip wire into a loop, tie it with the twist tie, set it out of the way and skip the rest of this section.

To make software speed switching work, you hookup the **RED** microclip to a chip leg on the motherboard. Unfortunately, the chip is under the disk drives and is difficult to get at. Refer to figure 6. The chip you must hook to is the 40 pin Tandy keyboard chip at U9 in the front corner of the computer. To gain access, unplug your machine again **(VERY IMPORTANT)** and unscrew the metal cover plate supporting the disk drives. Move it out of the way enough to get at U9 (the keyboard chip) or take them out entirely . Be extremely careful to not damage the disk cables. If you need to remove the cables from the disk drives, mark them as to where they go back on and in which direction.

Route the red microclip to the keyboard chip and hook it to pin 37 in the same manner you did with the black clip on the memory/dma board. Be sure the microclip wire will not be damaged or tangled when you replace the disk drives. Carefully move the disk drive assembly back into place, reatttach any cables you might have removed and fasten it down again. Set the speed switch to high speed and leave it there, otherwise software speed switching will not work.

Completely reassemble your computer and restart it again. It should come up at normal speed. Now it's time to create the two small programs you'll need to use software speed switching. Get a DOS disk with the program **DEBUG.COM** on it (comes as a utility program with DOS). Log into that disk and type in the programs with the following sequence. The symbol (cr) simply means to press the ENTER or carriage return on your keyboard. The xxxx is a number which depends on your PC - just ignore it.

```
 A>debug (cr)
-n fast.com (cr)
-a
-xxxx:0100 in al,62 (cr)
-xxxx:0102 or al,8 (cr)
-xxxx:0104 out 62,al (cr)
-xxxx:0106 int 20 (cr)
-xxxx:0108 (cr)
-rcx
CX 0000
 :8 (cr)
-w
Writing 0008 bytes
-n slow.com (cr)
-a 102 (cr)
-xxxx:0102 and al,F7 (cr)
-xxxx:0104 (cr)
-w
Writing 0008 bytes
-q
A>
```

You have now created two programs on your disk to switch speeds. Obviously, the one called **FAST** switches to high speed, while the one called **SLOW** switches to normal speed. Execute either one at any time to go the the desired speed. Since the default speed after reset or power up is normal speed, you might want to put the FAST program on your boot disk and include it in your AUTOEXEC.BAT file so that you will immediately switch to high speed.

HIGH SPEED AND PROGRAMS ...

Virtually all programs will run in high speed mode. Some programs are indirectly speed dependent - games for example may run too fast to play at high speed.

One final word about getting the most out of your new "souped up" machine. As mentioned previously, the Tandy 1000 is not a true PC clone - it is actually much closer to the infamous PC jr. in its internal design. For a "stock" 1000, that's somewhat unimportant to the user - but here you may lose some of your speed advantage by the way you load programs into your machine.

The key is access to the low 128k of memory that physically resides on the motherboard. In the 1000 (like the jr.), part of that ram is used for the video display, as well as for programs. That means the processor must "time-share" that block of memory with the video - i.e. sometimes it has to wait 'till the video is done using it. That will slow it down substantially (ram on your expansion board is uneffected and will run at full speed). Normally, DOS will consume much of that ram, automatically forcing your programs above that 128k block - for the most part. If you commonly use "ram disk" or "print spooler" software, configure those programs to load low in memory if possible (usually is an option in good versions), to further "use up" the low 128k. "Ram resident" programs (like Sidekick) already do just that.

OTHER HELPFUL HINTS ...

If you have a "NO-SLOT" clock/calander chip in your machine (installs underneath a ROM chip), the switch/microclip connector MAY not clear it. If so, **gently** bend the connector on the Sprint board upward at roughly a 45 degree angle before installing it.

All hard disks - hardcards included - have an INTERLEAVE FACTOR. It is beyond the scope of this manual to explain what it is and why it is a fundamental part of the way data is organized on the disk. Up to a point, the lower the interleave, the faster data can be accessed - speeding up apparent disk "speed". However, if the interleave is set too low for a particular machine, disk performance will drop significantly.

With the PC-Sprint 1000A, you can usually lower the interleave by one or two, thus indirectly speeding up disk operations. Lowering the interleave requires performing a "low level" format of the disk - **something only knowledgeable users should do**. If you don't know what this discussion is about, either get help or ignore the whole thing. There are "public domain" programs which can automate the process.

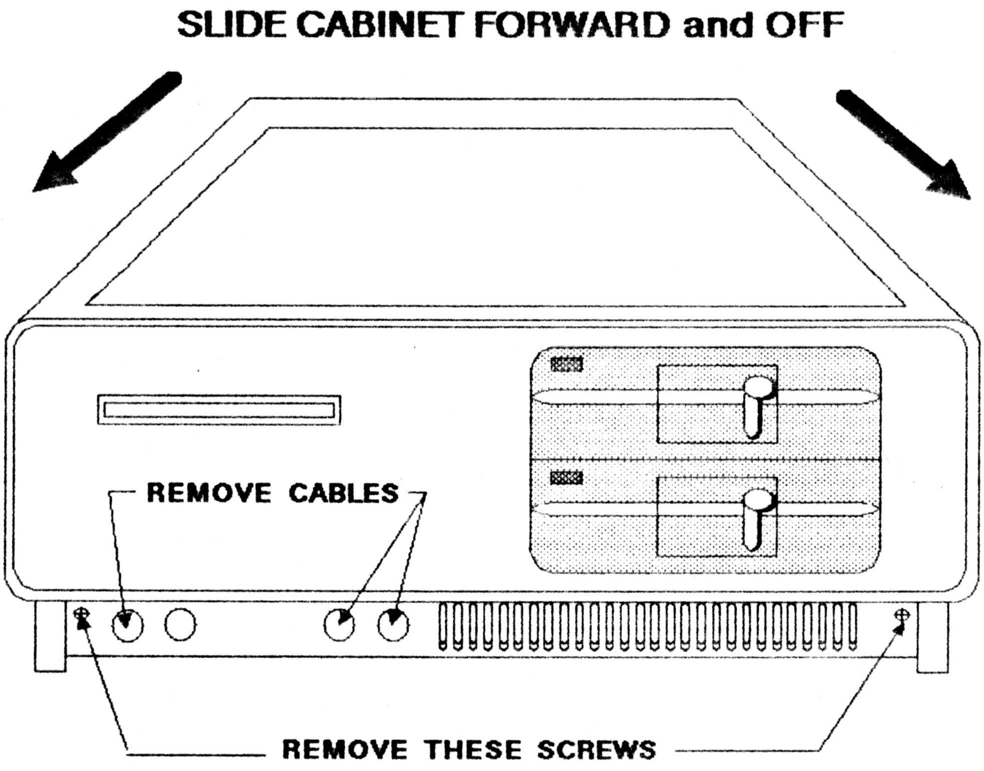


FIGURE 1

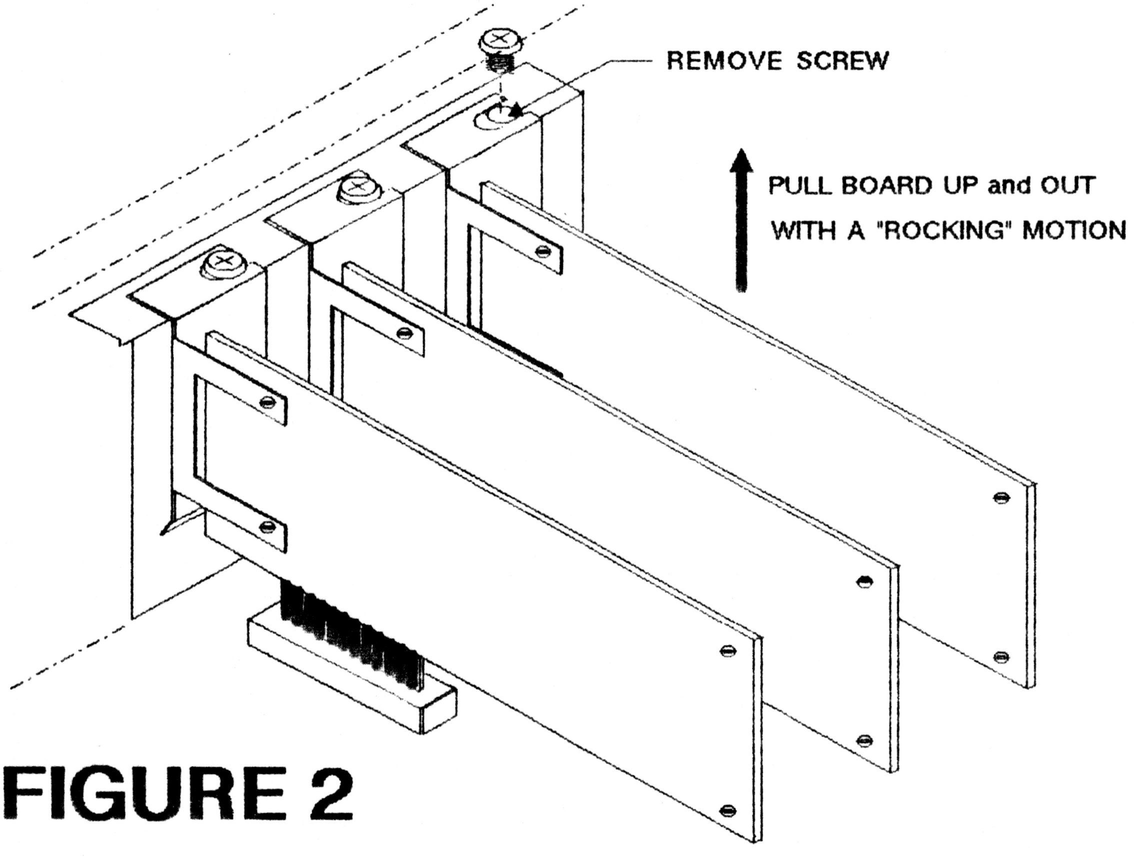


FIGURE 2

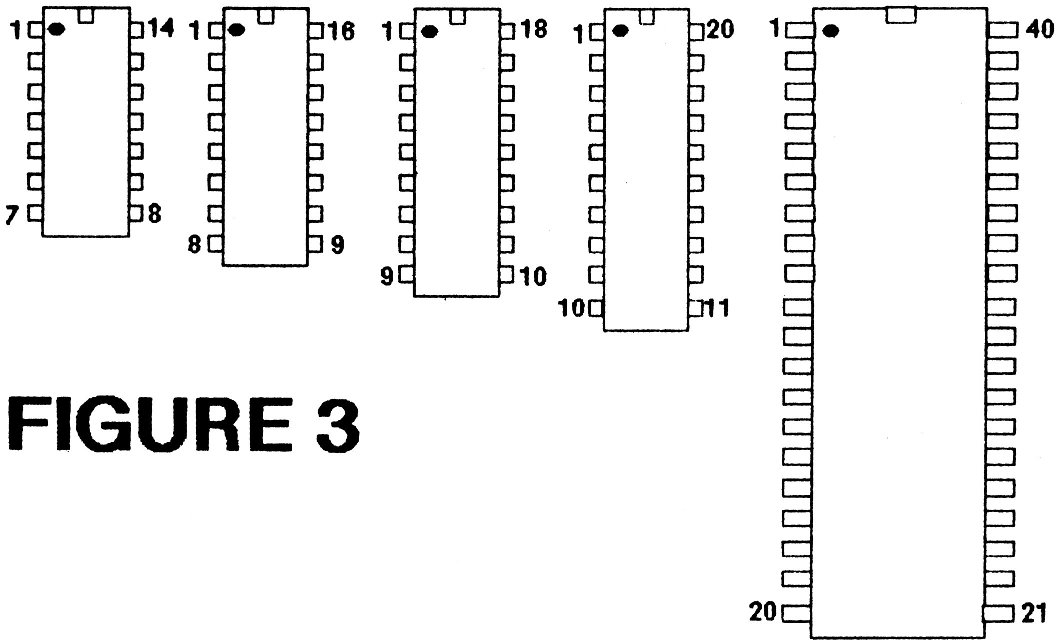
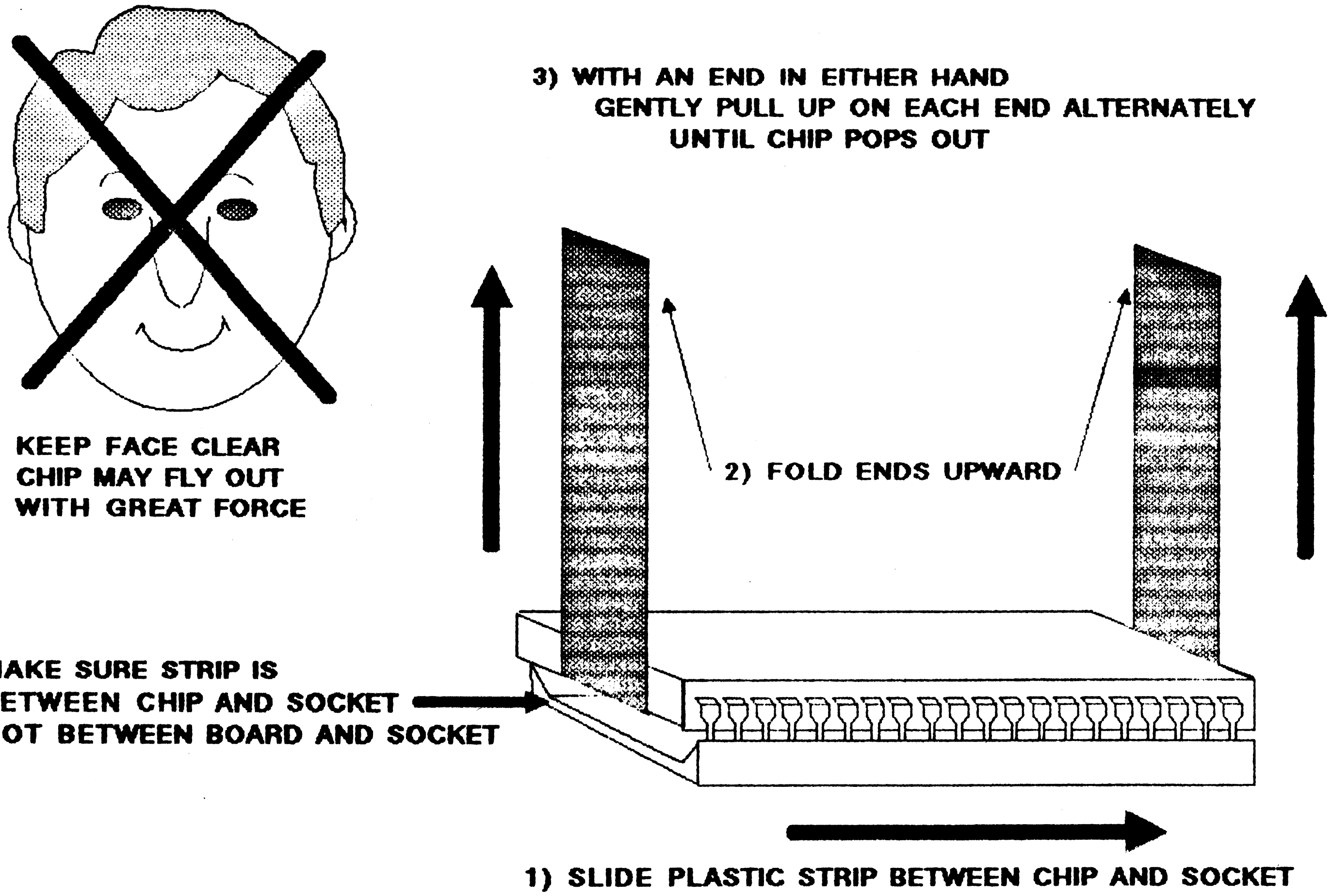


FIGURE 3



3) WITH AN END IN EITHER HAND
GENTLY PULL UP ON EACH END ALTERNATELY
UNTIL CHIP POPS OUT

KEEP FACE CLEAR
CHIP MAY FLY OUT
WITH GREAT FORCE

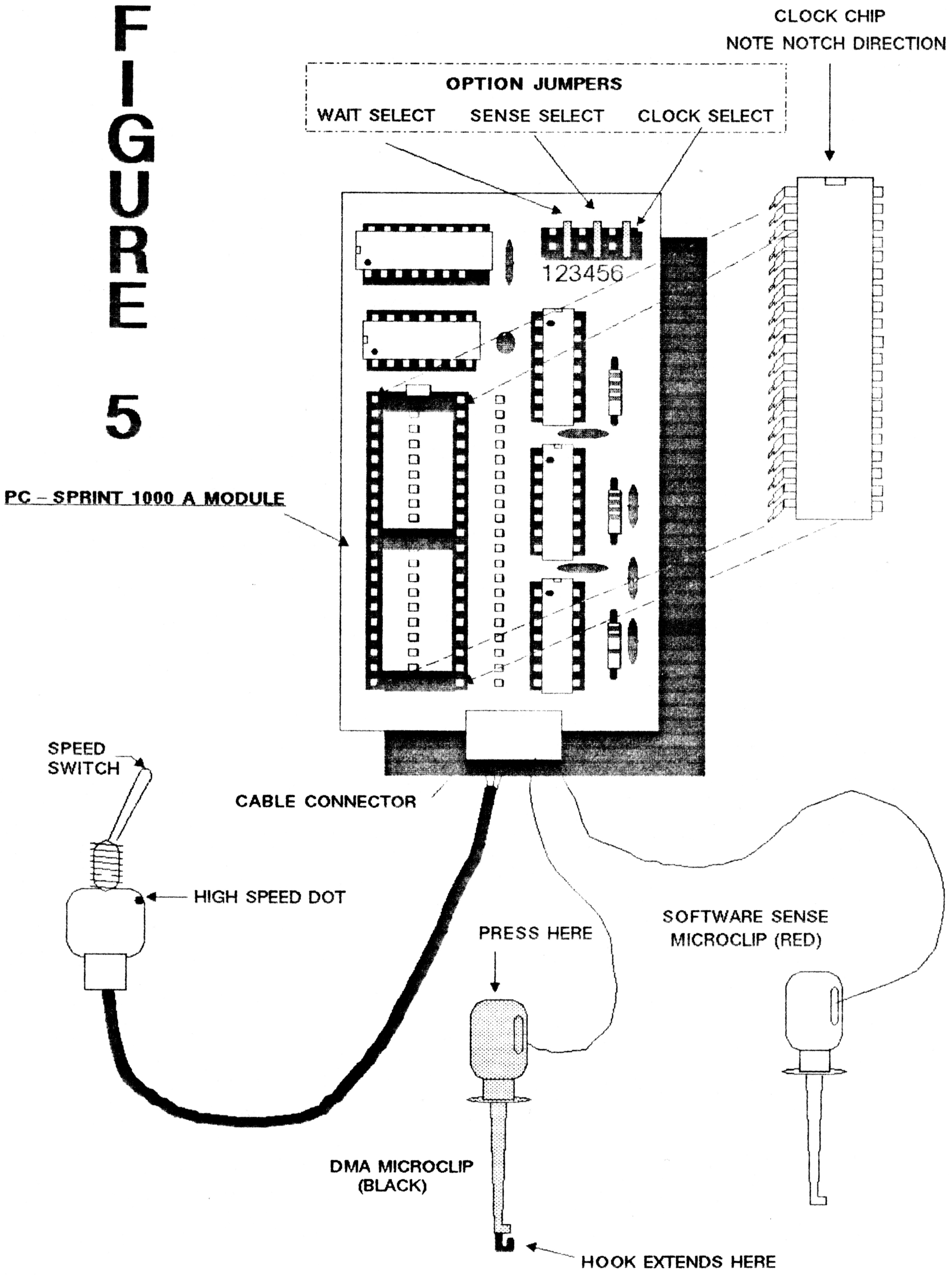
2) FOLD ENDS UPWARD

MAKE SURE STRIP IS
BETWEEN CHIP AND SOCKET
NOT BETWEEN BOARD AND SOCKET

1) SLIDE PLASTIC STRIP BETWEEN CHIP AND SOCKET

FIGURE 4

FIGURE 5


CLOCK CHIP
NOTE NOTCH DIRECTION
OPTION JUMPERS
WAIT SELECT
SENSE SELECT
CLOCK SELECT
123456
PC – SPRINT 1000 A MODULE
SPEED SWITCH
CABLE CONNECTOR
HIGH SPEED DOT
PRESS HERE
SOFTWARE SENSE MICROCLIP (RED)
DMA MICROCLIP (BLACK)
HOOK EXTENDS HERE

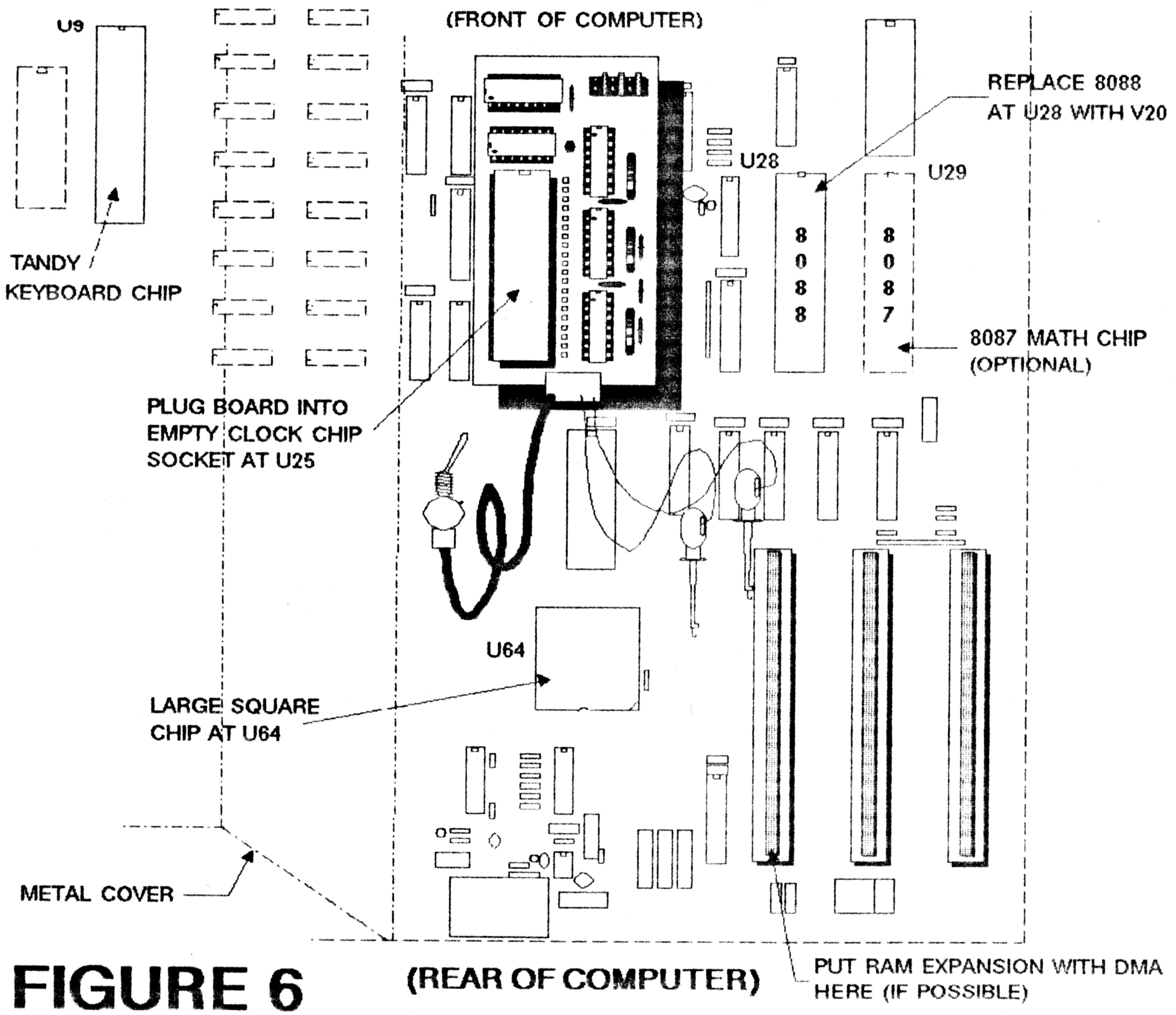


FIGURE 6

MEMORY EXPANSION BOARD with DMA

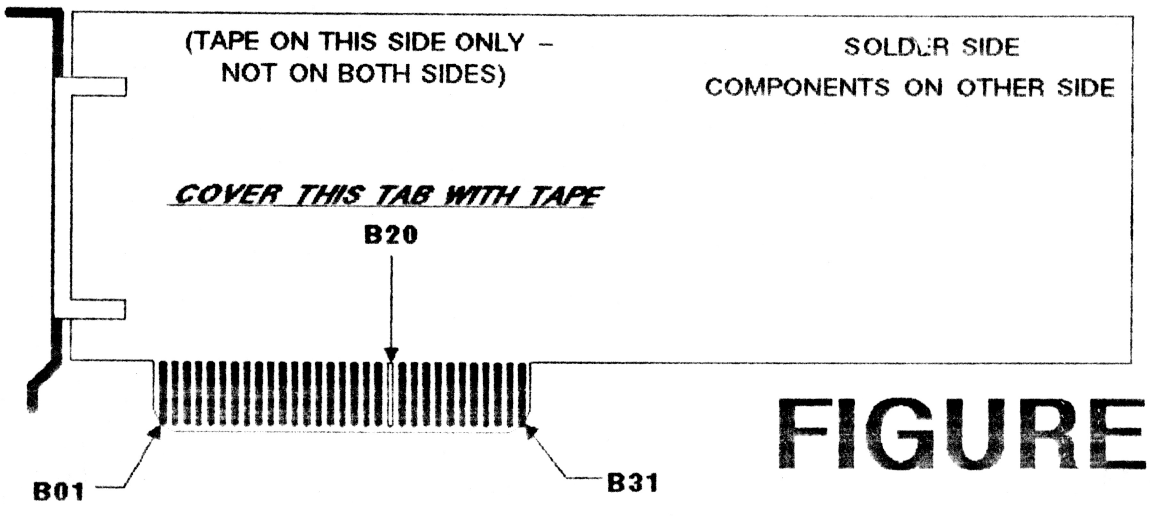


FIGURE 7

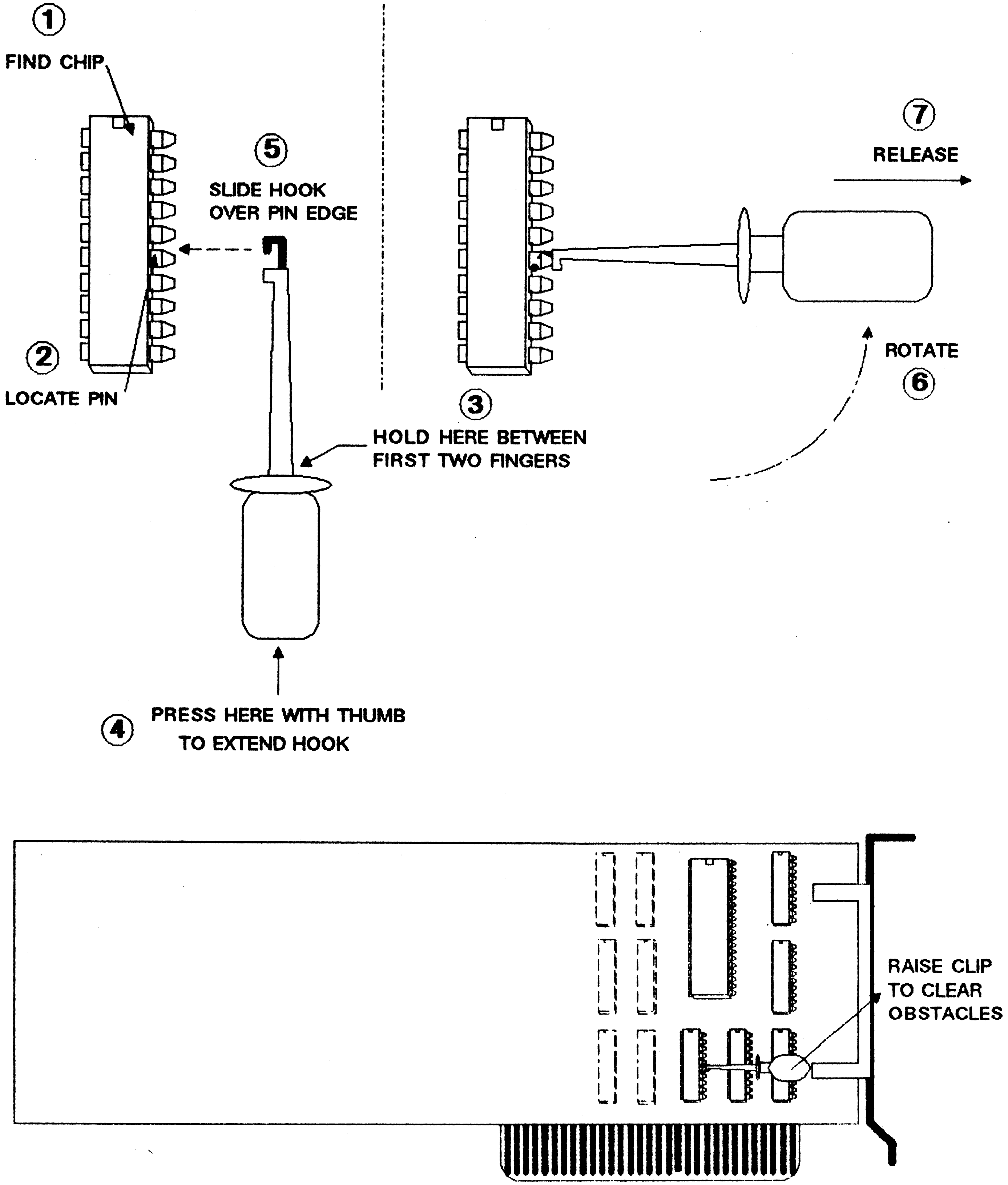

①
FIND CHIP
②
LOCATE PIN
⑤
SLIDE HOOK
OVER PIN EDGE
HOLD HERE BETWEEN
FIRST TWO FINGERS
④
PRESS HERE WITH THUMB
TO EXTEND HOOK
③
⑦
RELEASE
ROTATE
⑥
RAISE CLIP
TO CLEAR
OBSTACLES

FIGURE 8

TANDY 1000

01-13-88

DMA TIMING CLIP CONNECTION HINTS

The PC-Sprint 1000 and PC-Sprint 1000A include a microclip on the end of a wire connnected to the PC-Sprint board. You should connect this clip to the multifunction card in your Tandy 1000(A) after you isolate connector tab B20 with tape as described in the manual.

As the PC-Sprint instructions describe, the microclip is connected in a different location on various multifunction boards. Find the name of your board below, and use the brief instructions to help you locate the proper chip/pin to which the clip should be connected.

TANDY 25-1004 OR 25-1011 (MEMORY PLUS) BOARDS:

Location U1 pin #15 (main board on MEMORY PLUS - not "piggy-back").

ZUCKER FULL SIZE BOARD:

Newer board location U25 pin #1 chip 74LS04 (or 74LS14), or older board location U23 pin #5 or try U23 pin #6, chip 74LS00. Depends on age of board. Chip should be on top edge of card, to the left of the large clock/calendar chip.

ZUCKER HALF SIZE BOARD:

Zucker has made endless changes and patches to this board. Some of the following locations have worked for various models: Pin #12 on DMA chip, the DMA chip is the only 40 pin chip on the card. Location U28 pin #5. Location U28, Pin #11. Location U31, pin #5.

PBJ / MFB 1000 BOARD:

Location U36 pin #17, or U36 pin #4, or location U2 pin #4. Depends on age of board. Chip should be at the bracket end, near the bottom of board, probably the second chip up from the bottom.

4-IN-1 (MICRO-MAINFRAME) MULTIFUNCTION BOARD and TAN-PAC BOARD:

Boards with copyright 1985 (piggyback DMA board) use Z13 pin #11. Boards with copyright 1986 use Z36 pin #11. Memory Plus board, use Z23 pin #11.

PROGRESSIVE COMPUTER PRODUCTS 4N1A BOARD:

Pin #17 of 74LS244 in lower rightmost location on component side of board. It is difficult to connect the jumper to this location. You may want to solder stub of wire to this area to facilitate connection of the microclip.

MEGABOARD OR MASTERCARD (USUALLY BY MATHEW ELECTRONICS INC.)

The big DMA chip (8237) is piggybacked in center of board. There are 4 chips oriented in a vertical line to the right of DMA chip. Use third chip down from top. Should be 74LS04. Use pin #5.

PCA TECHNOLOGY BOARD:

Pin #12 on DMA chip, the only 40 pin chip on the card.

HARD DRIVE SPECIALISTS:

Location Z42 pin #8. Sometimes the **TAN-PAC** (see above) is re-labeled for HARD DRIVE SPECIALISTS.

DAS Technologies, Inc.

LIMITED WARRANTY

AND

USER AGREEMENT

This computer enhancement product is warranted against defects in material and workmanship for ninety (90) days from the date of purchase. Within this period, DAS Technologies will repair or optionally replace the product without charge. The product must be returned shipping prepaid to a location designated by DAS Technologies (postage due or COD shipments will not be accepted) along with a copy of the original sales invoice as proof-of-purchase date. Repaired or replaced products will be returned to the name and address on the sales invoice, unless otherwise directed in writing.

This warranty does not cover damage or failure caused by or attributable to Acts of God, abuse, misuse, improper or abnormal use, faulty installation, modification, lightning or other excessive voltage or any repairs other than those provided by DAS Technologies. DAS Technologies, Inc. is not responsible or liable for indirect, special, or consequential damages araising out of or in conjunction with the use or performance of the product or other damages with respect to any economic loss, loss of data, loss of property, loss of revenues or profit, or costs of removal, installation or reinstallation. Except as provided herein, DAS Technologies makes no express warranties, and any implied warranty of merchantability or fitness for a particular purpose is limited in its duration to the duration of the written warranties set forth herein. Within the 90 period, the original purchaser may terminate this agreement by returning the product and associated materials, shipping prepaid, in resalable condition, for a full refund of purchase price. Refunds will be issued within ten (10) business days of the arrival of the product.